IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Oiso Shoji, et al
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For	:	Dye Type Polarizing Plate
Examiner	:	Sow-Fun Hon
Art Unit	:	1722
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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450
on March 26, 2004 (Date)
Kevin S. Lemack
Name of applicant, assignee, or Registered Representative
Signature
March 26 2004
Date

Assistant Commissioner of Patents and Trademarks
Washington D.C. 20231

Sir:

DECLARATION UNDER 37 C.F.R. 1.132

I, Shoji Oiso, a citizen of Japan residing at 6-8-25-202,Kamiochiai,Chuo-ku, Saitama -shi, Saitama, Japan, hereby declare as follows:

1. I am one of the co-inventors of the above-identified application and am well versed in technologies of dye type polarizing plate.

2. I have read and understood the Office Action dated December 3, 2003 in the above case.

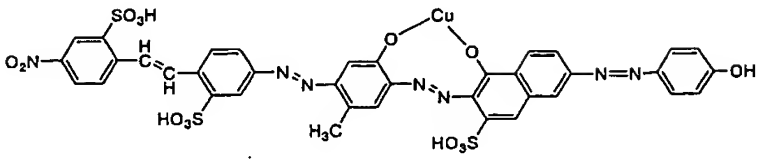
3. The following experiments were conducted by me or under my supervision, to compare performance of a dye type polarizing film using the specific dye in this invention with that of a dye type polarizing film using the dye described in U.S. Patent No.5548073(Misawa et al).

(I) Experiment:

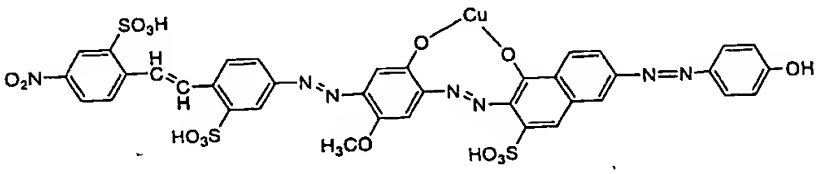
(1) Test Compounds

(a) Following Compounds No. 1 and 2 as described in Synthesis Examples 1 and 2 of the present specification:

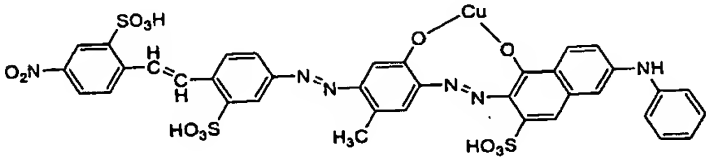
Present Compound No. 1(Pres.No.1)



Present Compounds No. 2(Pres.No.2)



(b) Following Compound (Comparative Compound) as described in Comparative Examples 1 of U.S. Patent No.5548073(Compa.Ex1)



Note: The synthesis of Comparative Compound

(a) 44.4 parts of sodium 4-nitro-4′-aminostylbene-2,2′-disulfonate was added to 600 parts of water and dissolved at 70°C. They were cooled to 30°C or lower and 32 parts of 35% hydrochloric acid and then 6.9 parts of sodium nitrite were added and stirred at 25 to 30°C for 2 hours. After adding 13.7 parts of p-crecidine and stirring at 25 to 30°C for 2 hours, pH was adjusted to 3 with addition of sodium carbonate and they were stirred further to complete the coupling reaction and filtered to obtain a

monoazo compound. After dispersing the resultant monoazo compound into 600 parts of water, 32 parts of 35% hydrochloric acid and then 6.9 parts of sodium nitrite were added and stirred at 25 to 30°C for 2 hours to conduct diazotize and obtain a monoazo diazotization reaction solution.

The monoazo diazo reaction solution obtained previously was added to the solution, in which 31.5 parts of N-phenyl-J acid compound was dissolved in 250 parts of water having pH 8, while being kept at a weakly alkaline condition with sodium carbonate, and stirred at 15 to 25°C to complete the coupling reaction. The reaction solution was salted out with addition of sodium chloride and filtered to obtain a water soluble dye of disazo compound.

The obtained compound (40 parts) was dispersed in 500 parts of water and 15 parts of crystal copper sulfate and10 parts of monoethanolamine were added thereto. The solution was heated to 95 ℃ and reacted for 10 hr. The reaction solution was salted out with addition of sodium chloride and filtered to obtain a water soluble dye for Comparative Compound as the copper complex salt dye.

(2) Preparation of dye polarizing films (sample films)

A polyvinyl alcohol of 75 μm thickness was immersed for 4 minutes in an aqueous solution being 45°C and having the concentration of 0.03% of the Test Compound and 0.1% of sodium sulfate. The film was stretched by five times at 50°C in an aqueous 3% boric acid solution and washed with water and dried while being kept in a stretched state to obtain a polarizing film.

(3) Measurement of transmittance and polarization degree

(a) A parallel transmittance of complete polarizing light(Par.Tr.CPL)

A sample film and Standard polarizing film(an iodine type polarizing film SKN- 18043P:manufactured by Polatechno Co., Ltd) were set out in a

spectrophotometer(Spectrophotometer MPS-2000 manufactured by Shimadzu corp.) such that the Standard polarizing film was placed at light source side in the spectrophotometer and their absorption axes of the sample film and the Standard polarizing film were parallel to each other. Thereafter, a parallel transmittance of complete polarizing light(Par.Tr.CPL) of the sample film was measured.

(b) A transmittance of complete polarizing light at crossed state(Cros.Tr. CPL)

A sample film and Standard polarizing film(an iodine type polarizing film SKN- 18043P:manufactured by Polatechno Co., Ltd) were set out in a spectrophotometer(Spectrophotometer MPS-2000 manufactured by Shimadzu corp.) such that the Standard polarizing film was placed at light source side in the spectrophotometer and the absorption axis of the sample film was perpendicular to the absorption axis of the Standard polarizing film. Thereafter, the transmittance of complete polarizing light at crossed state(Cros.Tr. CPL) of the Sample film was measured.

(c) A contrast, a single plate transmittance(S.P.Tr) and a polarization degree(Pola.D)

The these values were calculated from the values of above (a) and (b) by the following calculation formulae. (%) (ky) (%) (kz) ky/kz

Contrast (%)= {a parallel transmittance of complete polarizing light (ky) / a transmittance of complete polarizing light at crossed state(kz) } × 100

S.P.Tr (%) = { (ky + kz) / 2 } × 100

Pola.D (%) = { (ky - kz) / (ky + kz) } × 100

(4) The result of the Measurement

A single plate transmittance(S.P.Tr), a parallel transmittance (Par.Tr), A transmittance at crossed state(Cros.Tr), a polarization degree(Pola.D), a parallel transmittance of complete polarizing light(Par.Tr.CPL), a transmittance of complete

polarizing light at crossed state(Cros.Tr. CPL) and contrast of a parallel transmittance of complete polarizing light/a transmittance of complete polarizing light at crossed state(Contrast) are shown in following Table 1.

Table 1

	S.P.Tr (%)	Pola.D (%)	Par.Tr.CPL (%) (ky)	Cros.Tr. CPL (%) (kz)	Contrast ky/kz
Pres.No.1	43.57	98.39	86.5	0.7	124
Pres.No.2	43.57	98.56	86.5	0.6	144
Compa.Ex1	43.59	97.59	86.2	1.1	78

It can be understood from the above table that, when the dye polarizing films have almost same single plate transmittance(S.P.Tr) values, the each value of a polarization degree(Pola.D), a parallel transmittance of complete polarizing light(Par.Tr.CPL) and Contrast(ky/kz) of the present films is higher almost 1% (polarization degree), higher 0.3 - 1.3% (parallel transmittance of complete polarizing light(Par.Tr.CPL)) and lager almost 1.60(124/78) to 1.85 (144/78) times than that of the dye polarizing films having Compounds as described in Comparative Examples 1 of U.S. Patent No.5548073(Compa.Ex1).

(II) Consideration on the results:

In general, it is preferable that polarizing films have a high polarization degree(Pola.D), a higher parallel transmittance of complete polarizing light(ky) and a large Contrast(ky/kz) , that is, a lower transmittance of complete polarizing light at crossed state(kz) if the dye polarizing films have almost same single plate transmittance(S.P.Tr) values .

As shown in the Table 1, the present films(Pres.No.1 and Pres.No.2) have almost same single plate transmittance(S.P.Tr) values as the comparative film (the films

prepared by using the compound of Comparative Example 1) and the present films have higher or larger values in all the values of a polarization degree(Pola.D), a higher parallel transmittance of complete polarizing light(ky) and a large Contrast(ky/kz) than the comparative film. Especially, in the high polarization degree of 97% order, generally it is very difficult to increase the polarization degree into 98% order without decreasing a single plate transmittance. Accordingly, it is very surprising effects that the polarization degree value in the present invention increased almost 1% without decreasing a single plate transmittance and, further, the values of Contrast(ky/kz) of the films in the present invention is very high, such as 124(Pres.No.1) and 144(Pres.No.2) compared with the value, 78, of the films using the compound of Comparative Example 1 because the value of a parallel transmittance of complete polarizing light of the present films are both 86.5%(Pres.No.1 and Pres.No.2), higher than 86.2% of the comparative film, and , a transmittance of complete polarizing light at crossed state(kz) of the present films are 0.7%(Pres.No.1) and 0.6%(Pres.No.2), lower than 1.1% of the comparative film.

4. I further declare that all statements made herein of my own knowledge are true and that all statements made upon information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 101 of Title 18 of the United States Code and that such willful false statement may jeopardize the validity of the above identified application or any patent issuing thereon.

By: Syoji Oiso
Shoji Oiso
Date: 2004. March. 22